

2964R

What is claimed is:

*Det*  
*825*

1. A composition suitable for reducing engine sludge and degradation of elastomer seals comprising
  - a major amount of an oil of lubricating viscosity and
  - a minor amount of a nitrogen-containing dispersant wherein the nitrogen containing dispersant is a reaction product of
    - (I) a hydrocarbyl-substituted succinic acylating agent, wherein no more than about 20 mole percent of the individual molecules thereof have a hydrocarbyl substituent with a molecular weight of less than 500; wherein the hydrocarbyl substituent is a polymeric species consisting essentially of olefin monomer units of at least 3 carbon atoms; and
    - (II) at least one polyamine, wherein the polyamine is
      - (a) a polyalkylene amine containing at least one H-N< group; or
      - (b) a condensate of (i) a polyalkylene amine containing at least one H-N< group with (ii) at least one alcohol containing at least one ether group, amine group, nitro group, or additional alcohol group;

wherein in said polyamine (a) or condensed polyamine (b) no more than about 20 mole percent of the molecules contain 6 or fewer nitrogen atoms.
2. The composition of claim 1 wherein the substituent groups in (I) are derived from a polyalkene characterized by a  $\overline{M}_n$  value of about 1000 to about 10,000.
3. The composition of claim 2 wherein  $\overline{M}_n$  is at least about 2000.
4. The composition of claim 1 wherein the substituent groups in (I) are derived from one or more homopolymers or copolymers of olefins of 3 to about 16 carbon atoms.
5. The composition of claim 4 wherein the olefins are predominantly terminal olefins.
6. The composition of claim 4 wherein the substituent groups are derived from one or more homopolymers or copolymers of olefins of 3 to about 6 carbon atoms.

7. The composition of claim 6 wherein the substituent groups are derived from polybutene, polypropylene, or mixtures thereof.

5           8. The composition of claim 6 wherein the substituent groups are derived from polybutene in which at least about 50 mole percent of the monomer units are isobutylene units

10           9. The composition of claim 1 wherein the acylating agent is characterized by the presence within its structure of an average of at least about 1.1 succinic groups for each equivalent weight of substituent groups.

15           10. The composition of claim 1 wherein the acylating agent is characterized by the presence within its structure of an average of at least about 1.3 succinic groups for each equivalent weight of substituent groups.

20           11. The composition of claim 1 wherein within (I), no more than about 15 mole percent of the individual molecules have a hydrocarbyl substituent with a molecular weight of less than 500.

          12. The composition of claim 1 wherein within (I), no more than about 10 mole percent of the individual molecules have a hydrocarbyl substituent with a molecular weight of less than 500.

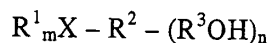
25           13. The composition of claim 1 wherein within (I), no more than about 5 mole percent of the individual molecules have a hydrocarbyl substituent with a molecular weight content of less than 300.

30           14. The composition of claim 1 wherein the alkylene moiety of the polyalkylene amine of (IIa) or (IIb) is ethylene.

          15. The composition of claim 1 wherein for (IIa), less than about 10 mole percent of the polyamine molecules contain six or fewer nitrogen atoms.

35           16. The composition of claim 1 wherein for (IIa) less than about 5 mole percent of polyamine molecules contain six or fewer nitrogen atoms.

17. The composition of claim 1 wherein the alcohol of II(b)(ii) is of the formula



5 wherein:

X is O or N;

m is 1 when X is O and 2 when X is N;

each  $R^1$  is independently hydrogen, a hydrocarbyl group, a hydroxy-hydrocarbyl group, or, if X is N, each  $R^1$  can be O so as to form a  $NO_2$  group;

10  $R^2$  is a hydrocarbylene group or an ether-containing group, having  $n+1$  sites of linkage

$R^3$  is an alkylene group of 1 to about 4 carbon atoms; and

n is 1, 2, or 3.

15 18. The composition of claim 1 wherein the alcohol of II(b)(ii) is a di- or tri-ethanolamine.

19. The composition of claim 1 wherein the alcohol of II(b)(ii) is trimethylolpropane.

20 20. The composition of claim 1 wherein the alcohol of II(b)(ii) is pentaerythritol.

21. The composition of claim 1 wherein the alcohol of II(b)(ii) is tris(hydroxymethyl)amino methane.

22. The composition of claim 1 wherein the alcohol of II(b)(ii) is tris(hydroxyethyl)amino methane.

30 23. The composition of claim 1 wherein the alcohol of II(b)(ii) is a polyoxyalkylene alcohol.

24. The composition of claim 1 wherein within (IIb) the condensed polyamine is prepared by reacting about 1 to about 3 equivalent of the poly-  
35 amine with 1 equivalent of the alcohol in the presence of an acid catalyst.

25. The composition of claim 1 wherein the nitrogen-containing dispersant is prepared by reacting (I) the hydrocarbyl-substituted succinic acylating agent with (IIa) the polyethylene polyamines.

5           26. The composition of claim 1 wherein the nitrogen-containing dispersant is prepared by reacting (I) the hydrocarbyl-substituted succinic acylating agent with (IIb) the condensed polyamine.

10           27. A method for reducing the formation of sludge and the degradation of seals in an engine, comprising lubricating said engine with the composition of claim 1.

Sub  
A2

15

28. A composition suitable for reducing engine sludge and degradation of elastomer seals comprising

a major amount of an oil of lubricating viscosity and

a minor amount of a nitrogen-containing dispersant wherein the nitrogen containing dispersant is a reaction product of

20           (I) a hydrocarbyl-substituted succinic acylating agent wherein the hydrocarbyl substituent is prepared from a polymeric species consisting essentially of olefin monomer units of at least 3 carbon atoms and wherein no more than about 20 mole percent of the individual molecules of said polymeric species have a molecular weight of less than 500; and

(II) at least one polyamine, wherein the polyamine is

25           (a) a polyalkylene amine containing at least one H-N< group; or  
(b) a condensate of (i) a polyalkylene amine containing at least one H-N< group with (ii) at least one alcohol containing at least one ether group, amine group, nitro group, or additional alcohol group;

wherein in said polyamine (a) or condensed polyamine (b) no more than about 20 mole percent of the molecules contain 6 or fewer nitrogen atoms.

30

Sub  
A3